



Chesapeake Bay

Highlights 2010

National Estuarine Research Reserve in Virginia

Location:

In order to incorporate the diversity of habitats found within the southern Chesapeake Bay, CBNERR maintains a multi-component system along the salinity gradient of the York River estuary. Reserve components include Sweet Hall Marsh, Taskinas Creek, Catlett Islands and Goodwin Islands.

Designated: 1991

Total Acreage: 3072

Lead State Agency:

Virginia Institute of Marine Science,
College of William and Mary

Reserve Web Sites:

<http://vims.edu/cbnerr>
<http://nerss.noaa.gov>

General Contact Information:

CBNERR

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Dear Friends of the Chesapeake Bay Research Reserve,

As part of 28 protected areas that make up the NOAA's National Estuarine Research Reserve System (NERRS), the Chesapeake Bay Research Reserve was established for long-term research, education and stewardship in support of informed management of our Nation's estuaries and coastal habitats. In this 2010 summary report, we highlight a diverse range of activities, products and services provided by the Reserve to further our understanding and better conserve our coastal resources and enhance support of our coastal communities. Guided by our management plan, the Reserve was able to build upon past efforts and show significant progress on new initiatives. Along the way, the Reserve has attempted to integrate its Research, Education and Stewardship programs in selected focus areas that represent high priority science and education needs for coastal managers and communities at local, regional and national levels. Reserve focal areas include:

- Functions and linkages of land-margin ecosystems;
- Ecosystem vulnerability to climate and human-induced stressors;
- Water quality and aquatic stressors; and
- Integrated ocean and coastal observing systems.

Below are highlighted some of our accomplishments in 2010 and we look forward to improving coastal management, advancing estuarine research, and educating current and future coastal stewards in 2011.

Administration

- Continued to foster mutually supportive partnerships and diversify funding sources in order to better achieve Reserve goals and objectives in light of a down-turned economy.
- Completed Reserve web page redesign (www.vims.edu/cbnerr) to provide greater programmatic information content, on-line course registration and improve access to Reserve resources.
- Continued to integrate and demonstrate residential 'green building' practices and technologies at Reserve Headquarters. To date, demonstrations include vegetated swales to direct stormwater to rain gardens, porous driveway pavers, native plant landscaping, rain barrels supplying solar powered water hoses, compost tumbler, interior motion detector light switches and paper/plastic/glass/battery recycling.

Research and Monitoring

The Reserve's research program is designed to enhance scientific understanding of coastal ecosystems, surrounding environments and the natural and human processes influencing such systems. To accomplish this, the Reserve monitors coastal ecosystems to describe reference conditions and changes over space and time, describe linkages within and between coastal ecosystems, and encourage and assist research activities within Reserve boundaries.

Research and Monitoring - cont

- Fully implemented the NERRS and Chesapeake Bay Program's shallow water quality monitoring program to assess water quality conditions in the York River and Mobjack Bay.
- Continued biological monitoring of emergent wetlands and underwater grasses in support of the NERRS Sentinel Site Initiative for detecting and understanding the effects of climate change on critical Bay habitats. 2010 marked a significant summertime dieback of eelgrass due to temperature stress.
- Continued operations of the Virginia Estuarine and Coastal Observing System (VECOS; www.vecos.org), which provides web accessible near and real-time, quality assured environmental data, and support of the Chesapeake Bay Observing System (CBOS). This effort was expanded in 2010 to include the deployment of a vertical profiling buoy in the Rappahannock River and sampling for harmful algal blooms in Virginia coastal waters.
- Along with colleagues from the Institute's Physical Sciences department, Reserve staff continued to provide field and numerical modeling assessments for fecal coliform Total Maximum Daily Load (TMDL) reduction strategies in selected Virginia Beach-Lynnhaven shallow water systems. The focus area for 2010 was Rudee Inlet in Virginia Beach.
- CBNERR continued to support two graduate research fellows whose studies focused on coastal and estuarine sciences. David Gillett completed his doctoral program (College of William and Mary/VIMS) and dissertation entitled "Effects of Habitat Quality on Secondary Production in Shallow Estuarine Waters and the Consequences for the Benthic-Pelagic Food Web."
- Due to their protected status and availability of extensive informational databases, the four components of the Reserve serve as platforms and living laboratories for long-term research. In 2010, over 25 projects were permitted within Reserve boundaries.



Education and Outreach

The Reserve's Education and Outreach Program strives to increase awareness, understanding, appreciation and wise-use of coastal resources -through formal K-12 education programs, teacher training, participation in college intern programs and implementation of family/community based programs.

- With critical support from NOAA's Bay-Watershed Education and Training (BWET) program, approximately 3,000 seventh grade students from local school districts were reached in programs that involved classroom visits and meaningful watershed education experiences through hands-on investigations both in the lab and field. In 2010, this program was expanded and now includes schools in Gloucester, Mathews and York Counties.
- The Reserve adopted Abingdon Elementary School in Gloucester County and provided the entire 1st and 5th grades with field programs, classroom visits and Bay display aquaria.
- Professional development opportunities for teachers were offered through a number of workshops including Chesapeake Studies in the Classroom, Meaningful Watershed Educational Experiences: Capacity Building, and Teacher Collection Days.
- Through 13 public outreach programs, including monthly Discovery Labs that provide an opportunity for family-friendly learning, over 1,000 life-long learners were reached in 2010. Lab topics included sustainable seafood, life of a waterman, ship wrecks, unique fish of the Bay, marine mammals, aquatic insects and the ever popular, Mad Lab: Night-time in the Bay. Selected Discovery Labs were also taken "on the road" to several schools to reach out to new, young audiences.



Education and Outreach – cont

- Over 100 students in grades 1-8 participated in week-long summer programs focusing on Bay Habitats (1st and 2nd grades), Bay Sustainability (3rd and 4th grades), Bay Stewardship (5th and 6th grades) and Eastern Shore Field Studies (7th and 8th grades). The five weeklong camps were made possible by a gift from an anonymous private donor.

Professional Training – ‘Coastal Training Program’

The Coastal Training Program improves the capacity and skills of coastal decision-makers by communicating the results of current research, making available science-based information, and providing a forum to increase networking and collaboration across local/state government and coastal management disciplines.

- Training opportunities were provided to 225 local and regional coastal decision-makers to support their efforts to wisely manage natural and community resources. Training topics in 2010 included Using Observing Systems to Address Coastal Management Issues, Introduction and Use of Virginia’s Natural Heritage Geographical Information System Data Explorer, Municipal Separate Storm Sewer Systems (MS4) - Outreach and Monitoring Strategies for Local Governments, Alternative Paving Treatments to Reduce Runoff, Wetland and Riparian Winter Plant Identification and Virginia Coastal Plain Perennial Stream identification and Assessment.
- The monthly Reserve sponsored ‘After Hours Seminar Series’ reached approximately 450 persons with timely management, cultural and naturalists topics presented by experts in Energy Choices in the Coastal Plain, CO2 and Rising Ocean Acidity, Mercury Pollution Threats, Sand Management 101: Beach Nourishment in Virginia, State of the Bay: A Comparison of Health Assessments, Sharks: Dangerous or Endangered, Bay Birds of Prey, and Werowocomoco – Virginia’s First Capital.



Stewardship

Stewardship connotes the responsible management of coastal resources using the best available science and developing information in order to maintain and restore healthy, productive and resilient ecosystems.

- As part of multi-reserve grant project with the NOAA’s Restoration Center, the Reserve completed a three year sampling program of salt marsh structural and functional parameters at three local restoration sites and two Reserve reference sites. Information is currently being analyzed through development of performance benchmarks, restoration performance indices (RPI), and multivariate regression techniques to identify effective indicators for restoration monitoring and evaluating restoration success.
- Using current inventories of the extent and condition of *Phragmites australis* at all four Reserve components, a genetic analysis of selected samples at the Sweet Hall Marsh component, and expert knowledge (participation by VIMS and VA-DCR), CBNER R developed the foundations of a research and management plan designed to guide our actions related to this invasive species over a five-year time period.
- In order to facilitate studies on the impacts of climate change to tidal wetlands and underwater grass beds, Reserve staff and NOAA partners (National Geodetic Survey and Center for Operational Oceanographic Products and Services) continued to develop local vertical elevation control networks within Reserve boundaries. Installed supporting infrastructure included long-term vegetation transects, ground-water wells, surface elevation tables (SETs) and geodetic benchmarks. A formal protocols document for obtaining accurate elevation information in coastal environments (vetted by the NERRS, NGS, and the National Park Service) is expected to be completed in 2011.



Advisory Service

• Reserve staff continued to provide a high-level of advisory service to the Commonwealth, regional government Bay-wide programs, nongovernmental organizations and professional societies; service included membership and participation in over 25 committees. Selected committee membership and service includes:

Federal Government (NOAA/NERRS)

- Strategic Committee
- Climate Change Workgroup
- SWMP Biomonitoring Committee
- Coastal Training Program (CTP) Oversight Committee
- Estuaries 101 Workgroup
- Sentinel Sites Oversight Committee
- Coastal and Estuarine Lands Conservation Program (CELCP) Workgroup
- Integrated Ocean Observing System Workgroup
- System-wide Monitoring Program (SWMP) Guidance Committee
- Restoration Science Workgroup
- CTP Performance Monitoring Workgroup
- Teachers on the Estuary Workgroup
- Education Market Analysis-Needs Assessment Workgroup

Federal/Regional Government (Other)

- Chesapeake Bay Program (CBP) Analytical Method and Quality Assurance Workgroup
- CBP Tidal Monitoring and Analysis Workgroup
- CBP Data Analysis and Monitoring Workgroup
- CBP Water Quality Addendum Workgroup
- CBP Data Management and Acquisition Workgroup
- CBP Criteria Assessment Protocol Committee
- CBP SAV Research Monitoring and Restoration Workgroup
- CBP Water Quality Steering Committee
- CBP Monitoring and Realignment Team

State Government

- Virginia Coastal Policy Team
- Surface Water Quality Standards Workgroup
- Virginia CELCP Evaluation Committee
- Virginia Nonpoint Source Advisory Committee
- Virginia Phragmites Workgroup

Local Government

- Dragon Run Steering Committee
- York River and Small Coastal Basin Roundtable

Other

- Virginia First District Environmental Advisory Council
- Virginia Water Monitoring Council
- Chesapeake Research Consortium Freshwater SAV Partnership
- CBOS Executive Steering Board
- Chesapeake Bay Education Council

Selected Reserve Contributions to Manuscripts, Reports and Other Publications

Moore, K., Shields, E. and J. Jarvis. 2010. The role of habitat conditions and herbivory on the restoration of submerged aquatic vegetation (SAV) into tidal freshwater regions of the James River in Virginia. *Restoration Ecology* 18: 596-604.

Jarvis, J. and K. Moore. 2010. The role of seedlings and seed bank viability in the recovery of Chesapeake Bay, U.S.A. *Zostera marina* populations following a large scale decline. *Hydrobiologica* 649: 55-68.

Blake, R. and E. Duffy. 2010. Grazer diversity affects resistance to multiple stressors in an experimental seagrass ecosystem. *Oikos* 119: 1625-1635.

Orth, R., S. Marion, K. Moore and D. Wilcox. 2010. Eelgrass (*Zostera marina* L.) in the Chesapeake Bay region of Mid-Atlantic Coast of the USA: Challenges in conservation and restoration. *Estuaries and Coasts* 33: 139-150.

Sisson, M., J. Shen, W. Reay, E. Miles, A. Kuo and H. Wang. 2010. A numerical modeling assessment for the implementation of a runoff reduction strategy plan for the restoration of Thalia Creek, Virginia Beach. Final Report submitted to US Army Corps of Engineers and City of Virginia Beach. Special Report No. 416 in Applied Marine Science and Ocean Engineering. Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia. 180pp.

Sisson, M., J. Shen, W. Reay, E. Miles, A. Kuo and H. Wang. 2010. The development of a management tool to assess bacterial impacts in Rudee Inlet, Virginia Beach. Final Report submitted to US Army Corps of Engineers and City of Virginia Beach. Special Report No. 423 in Applied Marine Science and Ocean Engineering. Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia. 178pp.